GAS HEAT in INDUSTRY

10/6 Per Annum — Formerly INDUSTRIAL GAS TIMES — OCTOBER, 1950

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GAS HEAT *in* INDUSTRY

Vol. XIV October, 1950 No. 157

ANNEALING BY GAS

Use of Silicon-Carbide Radiant Tubes Improves Furnace Performance

THE development and use of radiant tube gas-fired furnaces has received a new impetus in recent years from the use of silicon-carbide material for the tubes. Such tubes when used for the radiant heating of furnaces are 4 in. or somewhat larger internal diameter, in lengths ranging from 40 in. to 60 in., the length of the tube decreasing as the diameter increases, for manufacturing reasons.

Fig. 1, shows an annealing furnace made by the Gas Machinery Company of Cleveland, operating upon this principle, the working dimensions being 2 ft. 6 in. wide × 15 ft. long × 10 in. working height. Side and end walls consists of 9 in. insulating firebrick backed up by 4 in. of plastic insulation; the bottom is of 7½ in. insulating firebrick and 5 in. common brick. Although the working height is 10 in. the actual height from the furnace bottom to the centre of arch is 4 ft. 7 in. the difference between this and the working height at the door being occupied by the radiant tubes and the roller hearth.

In the United States, numbers of these furnaces have been installed operating upon natural gas of some 1,000 B.Th.U., coke oven gas of 575 B.Th.U., and butane 3,200 B.Th.U., the furnace illustrated being actually operated upon the last-named.

Gas is usually supplied at a pressure of 1 lb. per sq. in. at the control regulators and air at the same pressure.

In this particular case, four radiant tubes are employed, each 6 in. diameter by 15 ft. long, two located below the conveyor rollers and two supported from the roof in the

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manner shown in Fig. 2, with the usual corebusters.

The length of the furnace is such that the radiant tube sections are connected by gas-tight ball and socket joints which permit any two sections having an angular movement up to several degrees with respect to the other while the mating ball and socket surfaces are in contact, and further, to take care of the effects of expansion one end section is fixed while the opposite section floats against a spring in the manner shown in Fig. 3.

It will be noticed that the outlet casting at the right-hand side of the has to be controlled. This arrangement also materially assists the proper control of flame length so as to give even heating throughout the whole length of the tube.

Roller Hearth

Silicon carbide also serves as the material for the 6 in. diameter hearth rollers, of which there are 21 spaced at 12 in. centres. Each roller consists of a hollow steel water-cooled shaft on which is mounted concentrically the silicon carbide roller, the intervening space between shaft and roller being filled with a special in-

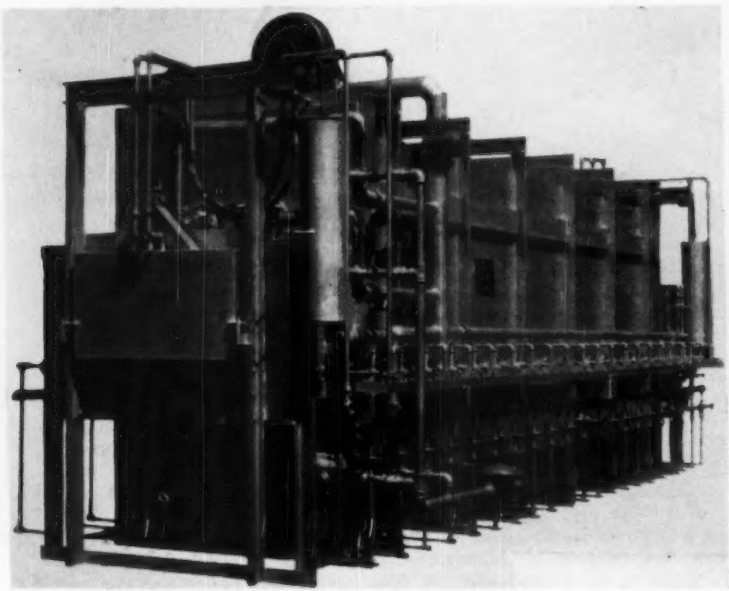


Fig. 1. General view of a radiant tube annealing furnace

drawing includes a venturi and an air aspirator pipe which latter is connected to the air supply from the fan or blower. The jet action of the air at this point assists the passage of the hot gases through the tube and maintains a negative pressure inside the combustion tube, so that in the event of leakage this takes place inwards into the tube and not outwards into the furnace, thus eliminating any possibility of contaminating the furnace atmosphere in cases where this

sulating concrete. The water requirements of the furnace are approximately 15 gallons per minute for all the hearth rollers and the furnace door when keeping the water temperature rise to 20° F.

The conveyor speed is variable between 0·4 and 4 ft. per minute, which enables furnace throughput to be readily varied, the range on this furnace being from 950 to 1,100 lb. per hour.

The furnace illustrated is used for

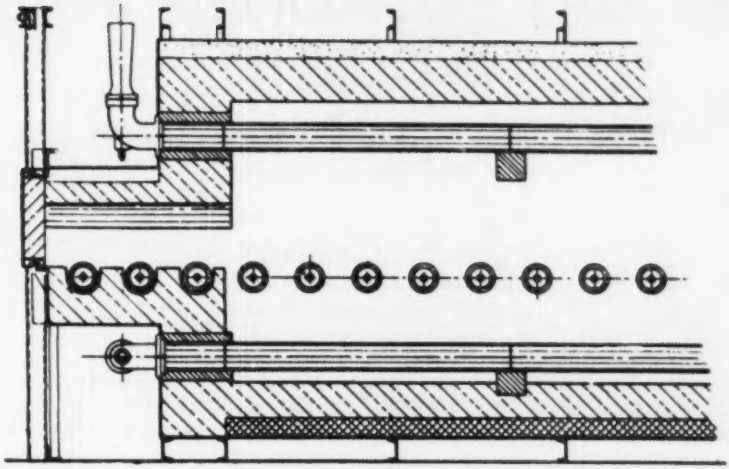


Fig. 2. Arrangement of radiant tubes and rollers

annealing stainless steel tubing in sizes varying from ¼ in. to 3 in. outer diameter at a temperature of 1,095° C. and a record taken over a run of 832 hours (furnace) showed that 467 U.S. tons of this material were annealed during this period, equivalent to 0·562 U.S. tons per hour, or 29 lb. of work per sq. ft. of hearth per hour. Average fuel cost was 1·86 dollars per ton.

By way of comparison, a batch type furnace on the same work showed only a heating rate of 9 lb. per sq. ft. of hearth per hour, with an average fuel cost of 2·92 dollars per ton of work annealed.

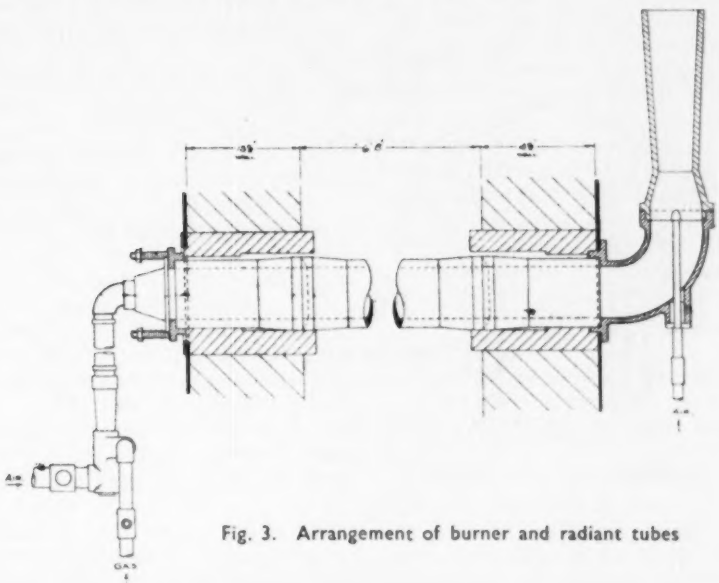


Fig. 3. Arrangement of burner and radiant tubes

GAS ECONOMIES IN INDUSTRY

Increased Production and Reduced Fuel Cost by Time and Motion Study

by R. D. KEILLOR
M.Inst. Gas E., M.Inst.F., Assoc. Inst. P. Inc.
Radiant Heating Ltd.

IN many industries using gaseous fuel the captains are faced with the possibility of increased fuel costs, on the other hand their plans to step up production are likely to encounter some opposition where increased volumes of gas may be demanded from an already overloaded gas distribution system.

Faced with increasing fuel costs on the one hand and a dynamic production policy on the other hand, industry generally must carefully examine existing heating methods with a view to eradicating obsolete methods and adopting modern methods calculated to improve heating efficiencies on existing produc-

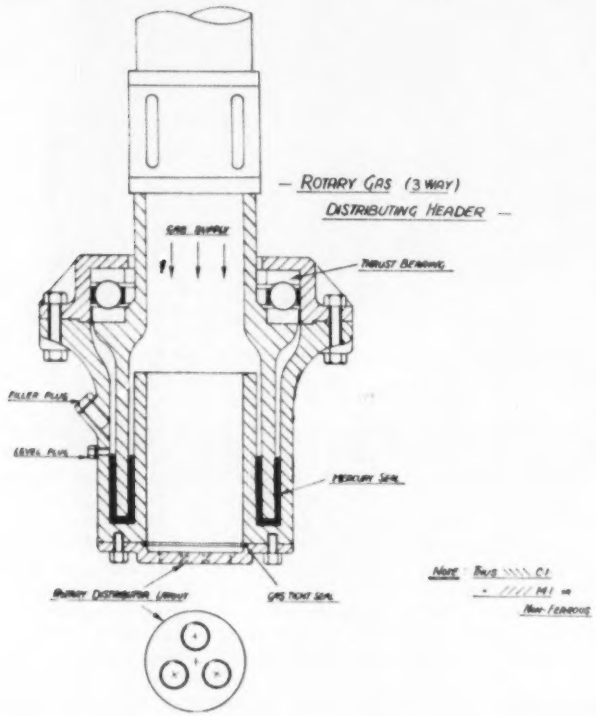


Fig. 1. Rotary gas distributor designed by Radiant Heating Ltd.

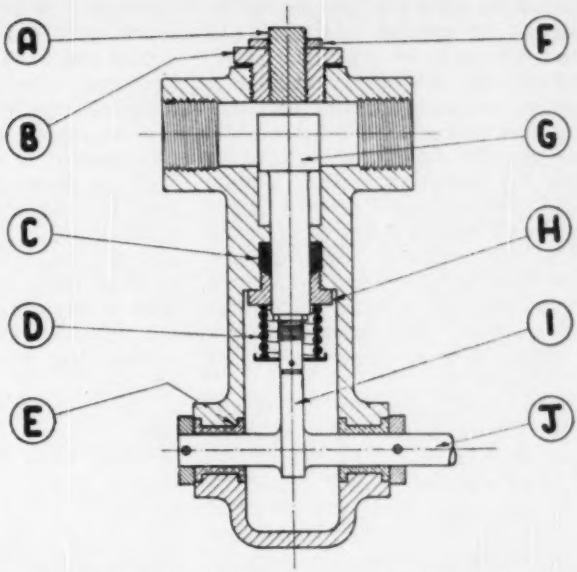


Fig. 2.

Automatic Economy Valve for Cam or Profile Cam Operation
A. Sensitive gas adjusting screw.
B. Access plug.
C. Packing.
D. Return spring.
E. Split bearings.
F. Locknut.
G. Plunger.
H. Gland nut.
I. Cam.
J. Drive spindle.

tion lines, in this way all possible fuel resources are released to facilitate further expansion.

Reasonable Cost

The application of time and motion studies to heat treatment processes has disclosed many established weaknesses in heating technique which can now be corrected by the employment of simple correctives. The cost of introducing the necessary improved heating technique is usually quite reasonable having regard to the savings effected in running costs and the value of potential fuel resources made available for expanding production within the capacity of existing gas distributing installations.

There are two main headings under which weaknesses in established heating technique are found to fall. The first is speed of heat transmission and the second is wastage of fuel while work is being moved progressively from one heating station to another.

Dealing with speed of heat transmission, experience shows that as radiant heat and turbulence enter largely into the problem it is evident that "psychological" or lazy distant flames have no part in fast efficient heat transmission. Optimum results attend the use of snappy short flames close to the work or a combination of short flames and radiant surfaces. Both of these techniques take advantage of the scientific fact that the intensity of radiant heat transmission varies with the square of the distance separating the source from the work. Again, the use of short snappy flames or surface combustion surfaces as heat transmitting sources enable a close approach to the work so that the full benefits of turbulent flow are obtained as the products of combustion are directed immediately round the work.

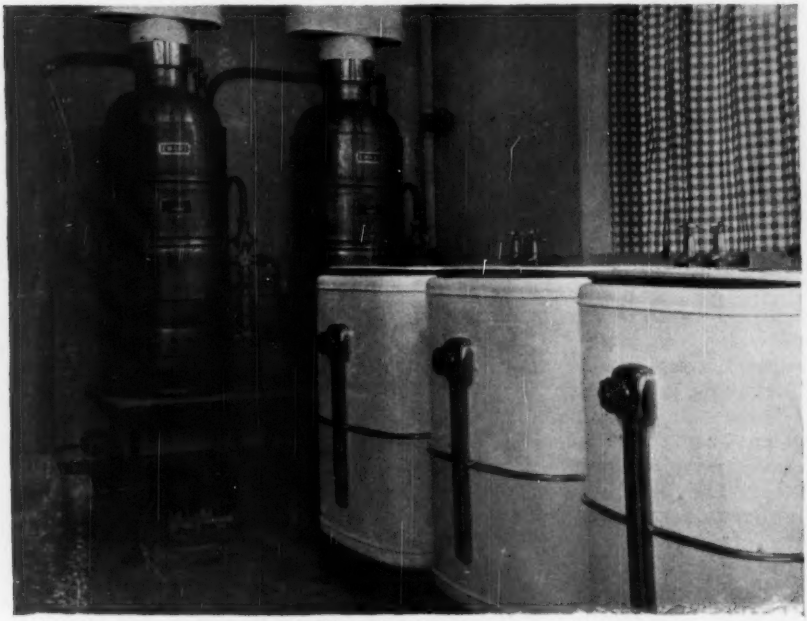
Fuel Wastage

With regard to fuel wastage, this applies most noticeably in rotary machines, where (a) static heating burners are grouped underneath and the work moves horizontally in a series of operational jerks through the heating section of the complete 360° cycle, and (b) the various heating burners are stationed above and

around the main rotating part of the machine at specific intervals. In machines such as described at (a) and (b) one can readily visualise a number of radial burners transmitting heat uselessly while the work is periodically moved in accordance with the operating cycle. Again, with "psychological" or lazy flames employed there is a lack of precision about the practical heat transmission result achieved and both these weaknesses can account for serious fuel wastage. Thermostatic control is difficult to apply to such machines as a rule.

Two obvious remedies can be applied, (1) the burners can be automatically controlled by means of one or more economy valves geared to or cam-actuated from the main drive so that gas consumption is reduced to a minimum while the work is moving between stations, and (2) a rotary gas distributor can be provided so that the burners are carried round with the work and are designed and fixed in such a way that optimum heating efficiency is obtained, thermostatic control can also be readily employed when this arrangement is adopted. Either or both of these practical correctives may be employed as required, depending upon the nature of the process and the timing of the operators; in some cases very material economies in gas consumption arise from the reduction of wastage and improved heat transmission efficiency effected.

The accompanying drawings illustrate a rotary gas distributor and economy valve designed by Radiant Heating Limited (Figs. 1 and 2 respectively). These fittings are available in a variety of sizes suited to modern precision heating machines and to low or high pressure gas, or gas air mixtures, as required.



This picture was taken at the "Dolly Tub" Laundrette, at Folkestone, where they have installed Ewart H/B Industrial Multipoint Water Heaters, to supply hot water to their battery of washing machines

FELT PROCESSING

and Cabinet Manufacture

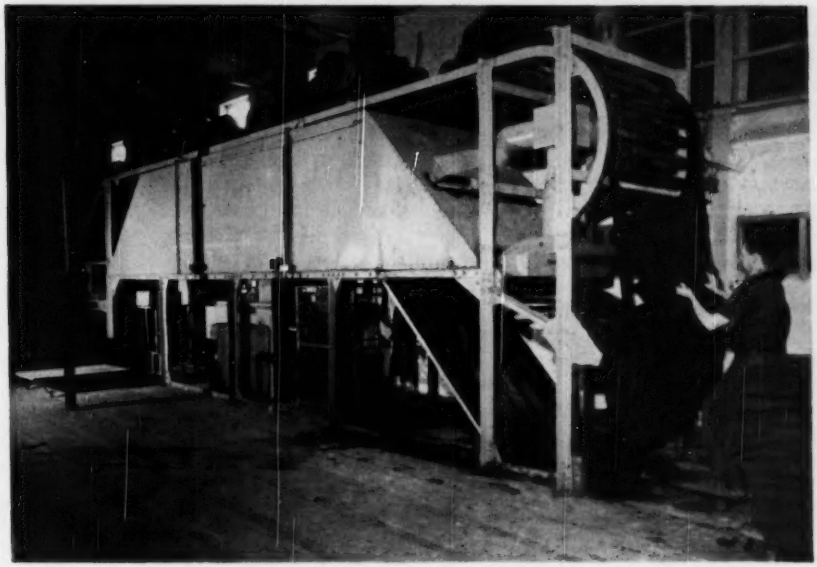
IN the surge of new industries to South Wales since the War it is particularly interesting to note the part which gas plays in the mechanical processes which bring to this country each year many millions of sorely - needed dollars. The versatility of these products is boundless and in every case where gas is the controlling fuel the reason for its employment is given in the one word —reliability.

Many instances have been given in this publication during the past 12 months of the endless variety of uses to which gas is being put, and the latest to attract the notice of our correspondent in Wales was in the manufacture of woollen felts and cloths, hair felts for furnishing, felts for heat and sound insulating in cars, and washers.

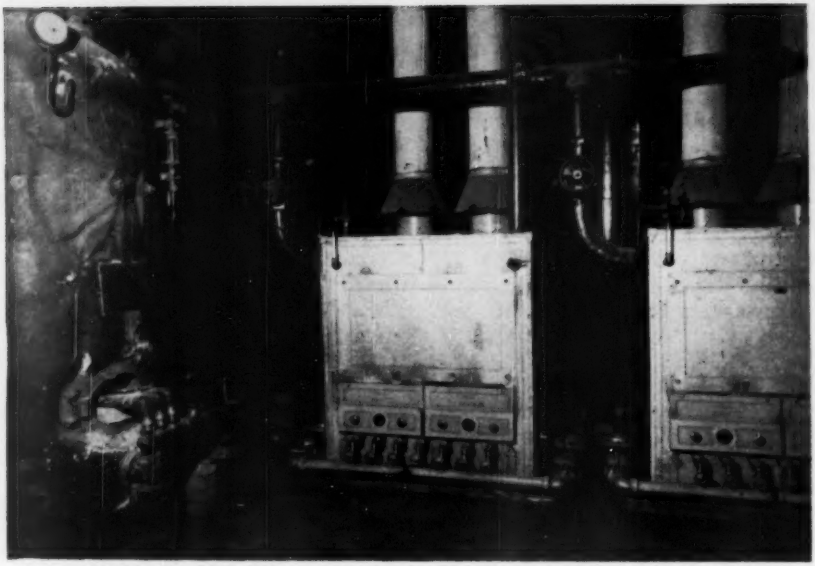
All these products are now being turned out at Mountain Ash, Glamorgan, by Sterling Textile Industries Ltd., who, with M. and P. Woodware Ltd., are incorporated in Mountain Ash Industries Ltd. Gas is playing a similarly important role in the M. and P. workshops, turning out television and wireless cabinets. Mountain Ash Industries consumed over 2½ million c. ft. of gas in March, 2 million in April and over 1½ million in July. With their extensive gas-fired heating system in use, there was a total consumption of over 1 million c. ft. during March and April.

Drying

The most important part which gas plays in textile manufacture is in the drying process. Pieces of felt



The pieces of felt are assembled to be taken through the gas-fired drying oven



The two Ideal boilers which control the heating system together with the J. Hickey and Sons vertical steam boiler (left) converted to gas

are placed on rows of iron bars passing through a 35 ft. long gas oven, a piece taking 45 min. to undergo the complete operation. In the operation of this process there is always danger of fire, although in actual practice at the works it is a rare experience. Provision has been made to deal with it for attached to the oven is a Minimax fire extinguisher system. Should there be at any time an outbreak within the oven this can tackle it instantly from the inside and extinguish the fire in 5 seconds.

A 1½ in. (inside diameter) pipe leads into the combustion chamber (2 ft. by 4 ft. by 5 ft.) which is controlled by an Ether shut-off valve.

To meet increasing demands for output a second and larger gas oven has been ordered and will shortly be installed. This will consume about twice the amount of the present oven and will have three jets leading into the chamber.

Steam Boiler

One of the most interesting examples of gas utilisation is to be found in a vertical steam boiler made by J. Hickey and Sons Ltd., Richmond. After consultation with the local gas undertaking it was decided to convert this boiler from coke to gas. If necessary it can be worked up to a pressure of 120 lb. but a 45-80 lb. pressure is sufficient to meet all requirements. A safety valve is set at the 120 limit.

This boiler is providing power for the steam presses but, with a few simple connections, it can be turned over to heat water for washing and cooking purposes, an adaptability that is of the greatest value during the summer months. Furthermore, within a few hours it could, if necessary, revert to the use of coke. Mr. W. Abbot, manager of the Sterling Textile Industries Ltd., explained to our correspondent the great economic benefits to be derived by this change-over. Firstly, it had eliminated a considerable item of labour costs in as much as there was no necessity for stokers. Secondly, no costs were incurred in the transporting of fuel; thirdly, with every available space being required

to meet the ever increasing demands for production, there were none of the usual storage problems.

Heating System

The heating system is controlled by two gas-fired Ideal boilers installed by Dean and Beale of London, and throughout the factory are thermostatically controlled fans distributing hot air.

Gas is also used in the adjacent carpentry shops of the associated firm of M. and P. Woodware. One of the routine jobs of their workshops is the melting down of glue, so that it may be reduced to a condition sufficiently fluid for use on the work bench. With gas as the heating agent, the particular glue used at this factory requires a 75° F. temperature to bring it to melting point. A 3 ft. glue pot is used which takes four 28 lb. cans at a time. As is the case with most industries, temperatures have to be very carefully watched, for in this melting operation, if 75° were exceeded the glue would lose its adhesive qualities and be wasted. A glue - spreading machine and a vacuum press for veneering shaped mouldings are two other sections of the workshop depending entirely on gas. To round off its service to Sterling Textile Industries Ltd., gas takes its normal place in the domestic work of the large canteen kitchens where cookers, grid and fish fryer are in daily use.

Research Committee to Assist Gas Council

ONE of the major duties placed on the Gas Council, as the central advisory, co-ordinating and financial body of the gas industry, is the organisation and conduct of research.

The Gas Council announces that, to assist it in the discharge of this function, it has set up a Research Committee, to consist of three eminent men of science not engaged in the industry, three members of the Council, the President for the time being of the Institution of Gas Engineers, the Livesey Professor for the time being at Leeds University, and the directors of the Research Stations (probably three) which it is intended to establish.

The Chairman of the Committee will be the Chairman of the Gas Council, Sir Edgar Sylvester, K.B.E.

Two scientific members have been invited and have agreed to join the Committee, Sir Robert Robinson, O.M., F.R.S. and Sir Cyril Hinshelwood, F.R.S.

Sir Robert Robinson, who has been Waynflete Professor of Chemistry at Oxford University since 1930 and President of the Royal Society since 1945, has held professorial chairs in organic chemistry in many universities in this country and in the Commonwealth overseas. He was President of the Chemical Society from 1939 to 1941, and in 1947 was awarded the Nobel Prize for Chemistry.

Sir Cyril Hinshelwood has been Dr. Lee's Professor of Chemistry at Oxford since 1937. He was President of the Chemical Society from 1946 to 1948. The Royal Society awarded him the Davy Medal in 1943 and a Royal Medal in 1947.

The three members of the Gas Council who will serve on the Committee, and who all have scientific or technical qualifications, are:—Mr. E. Crowther, Chairman of the Northern Gas Board, Dr. R. S. Edwards, Chairman of the North Eastern Gas Board, Mr. W. K. Hutchison Chairman of the South Eastern Gas Board.

The President of the Institution of Gas Engineers for the current year is Mr. F. M. Birks, C.B.E., Deputy Chairman of the North Thames Gas Board, while the Livesey Professor at Leeds University is Professor A. L. Roberts, Ph.D., F.R.I.C.

The existing laboratories of the North Thames Gas Board have been recognised as the nucleus of the London Research Station and Dr. H. Hollings, F.R.I.C., for some years Controlier of those laboratories, has joined the Committee as Director-designate of the Station.

This Research Committee will be responsible for advising the Gas Council on all matters connected with research, for drawing up programmes of research and for reviewing progress from time to time.

Glazing Bakers' Pans

Gas is used for Three Processes

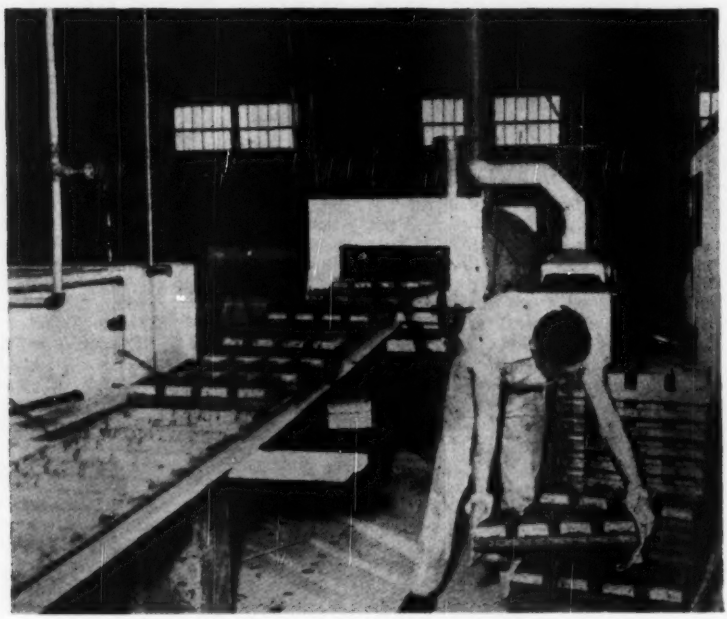
FROM America comes this report of a new application of gas—the glazing of bakers' pans, an industry that 2 years ago did not exist. The Olson Panglaz Co., has just opened its third plant for the purpose of applying silicon to metal pans. A pan treated with this glaze does not have to be greased, and this fact results in a variety of economies.

Silicon is a colourless liquid slighty thinner than water, and it is sprayed into the inside of the pan. After glazing the material resembles a thin sheet of glass.

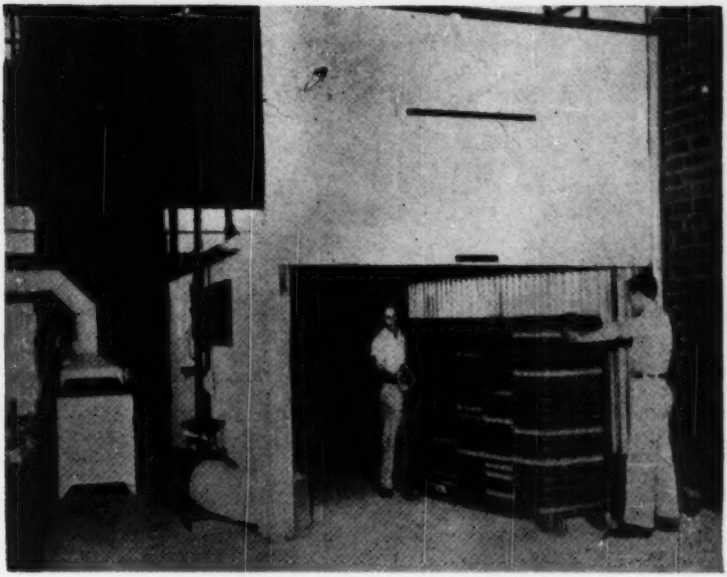
Gas is employed in three steps of the process. The first step is the highly important one of cleaning the pans of all grease and carbon. The next step is drying, and the third, glazing.

Cleaning

Vapour degreasing is used for cleaning, and following this operation the pans are transferred to soak tanks where the carbon, which is burned on in the process of baking, is removed. These tanks are 4 ft. wide by 4 ft. high and 5 ft. long. They contain 350 gallons of a chemical mixture, heated to 212°. The tanks are equipped with injection burners which inject hot air into 5 in. diameter seamless tubes coiled on the inside of two sides of the tank. A jet washer, where fresh, cold water, under 90 lb. pressure is used.



The unloading end of the drying oven



Truck load of pans being removed from curing oven

completes the operation.

This process of cleaning is very important as a single particle of dirt or carbon may interfere with proper glazing. Of equal importance is the drying of the metal after it has been cleaned. The pans must be absolutely dry before the glaze is applied.

From the jet washer the pans are taken to the conveyorised dry-off oven, a half cylindrical tunnel, 16 ft. long heated by a row of burners from underneath. The pans move slowly through the oven (requiring 15 minutes to make the journey) at a temperature of 440°.

Glazing

The glazing cabinet is 8 ft. long and the pans move through this at the rate of 4 ft. a minute, receiving a coating of liquid glaze automatically sprayed by a series of adjustable jets. They are then air-dried at room temperature for 1 hour.

The curing oven is the next step. This is a gas-fired oven 18 ft. long by 10 ft. high by 7 ft. wide, and is insulated by Fibreglas. This process requires 4 hours, during which time, temperatures must be closely controlled between 430° and 440° C. One important reason why the temperature must be accurately controlled is that tin melts at approximately 449° C. If the temperature rises much above 440° C. there is a danger of destroying the entire batch in the oven.

This accurate temperature is made possible by two Maxon premix burners automatically controlled by Brown instruments. The temperature of the oven can be raised to 450° C. in 8 minutes.

Extent of Business

A problem which has always confronted bakers is the fact that the grease on the pans will burn, creating carbon and smoke. Since no grease is required with a glazed pan, not only is the grease saved as well as the time and labour of greasing, but a much cleaner bakery and product results.

The extent of this comparatively new business can be judged from the fact that the average number of pans per bakery in the South West of America is anything from 8,000 to 16,000. The glaze has to be renewed three or four times a year, depending on the kind of usage a pan received.

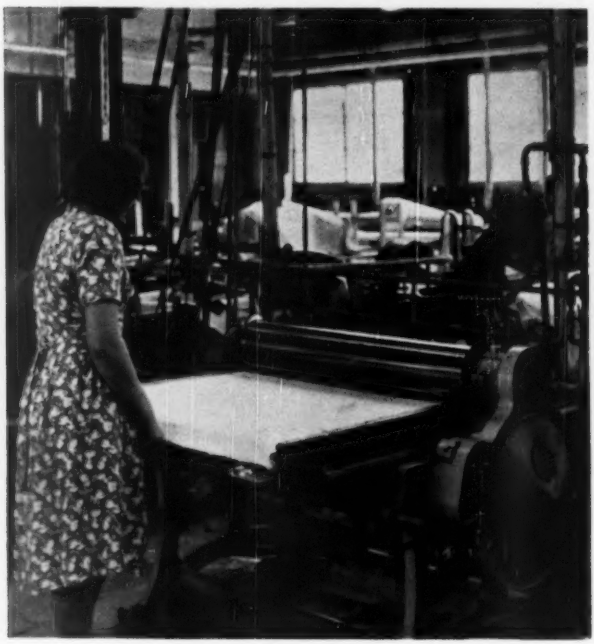
PUBLIC LIGHTING ENGINEERS' EXHIBITION

THE Gas Council were responsible for the organisation of a gas section in the exhibition of the Association of Public Lighting Engineers in connection with the annual meeting at Bournemouth from the 18th to 22nd of September. The gas section consisted of eight stands, representing the makers of gas lighting equipment.

Apart from the Gas Council, exhibitors in the gas section included the British, Foreign and Colonial Light Controlling Co. Ltd., William Edgar and Son Ltd., Horstmann Gear Co. Ltd., Metropolitan Gas Meters Ltd., Parkinson and Cowan (Gas Meters) Ltd., William Sugg and Co. Ltd. and Willey and Co. Ltd.

The Gas Council's exhibit included a working model of a main road showing the various types of street lighting, and a photographic display. The model was of a 42 ft. main thoroughfare which could be lighted in turn by lanterns having distributions corresponding to each of the main classifications in the Code of Practice for Street Lighting. The lanterns for "non-cut-off" distribution were ranged in staggered formation with appropriate overhang, spacing at 120 ft. "Cut-off" lanterns were mounted centrally over the thoroughfare with a spacing of 90 ft. In each case the lamps were mounted at a height of 25 ft. The effect of changes in the road surface on the type of lighting was also shown in the model.

The exhibit also included photographs to illustrate the different types of road which come under the "Class B" category. Some of these are residential with little through traffic, and others carry a fair volume of traffic. The photographs showed the type of lighting most appropriate for the varying type of road.



The value of gas-firing in machines for collar blocking and finishing was shown at the recent Laundry, Dry Cleaning and Allied Trades Exhibition, on the Gas Council stand. Our illustration shows a gas-fired machine in use in a Midlands Laundry

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PAXMAN BOILERS

For Steam Generation and Central Heating

AFTER many years of experience in the production of boilers, Davey, Paxman and Co. Ltd., of Colchester, have evolved designs which are of special interest to the gas industry.

As shown by the illustrations, the Paxman Economic boiler is entirely self-contained and requires no external brickwork. Firing may be by solid fuel, oil or gas. The two designs of Economic boiler—namely the "Double-pass" and the "Treble-pass"—give a high degree of efficiency, with low maintenance cost, and they occupy considerably less space than a Lancashire or Cornish boiler of equivalent steaming capacity.

The "Double-pass" Boiler

In this type the products of combustion pass from the furnace into a refractory-lined steel combustion chamber located at the rear of the boiler. From this point the gases are returned through the smoke tubes to a smokebox at the front of the boiler and thence to the chimney. A main feature of this is that the shell of the boiler is extended at the back end and lined inside with firebricks to form a deep combustion chamber, which, covered by the steel outer shell, is rendered completely air and gas tight. Furthermore, where conditions permit, this type of boiler operates with natural draught.

The "Treble-pass" Boiler

Specifically designed for installation where limited space will not accommodate the double-pass type, the Paxman "Treble-pass" boiler, whilst retaining all the advantages of the former, occupies a minimum of space and gives efficient service where other types of boilers could not be installed.

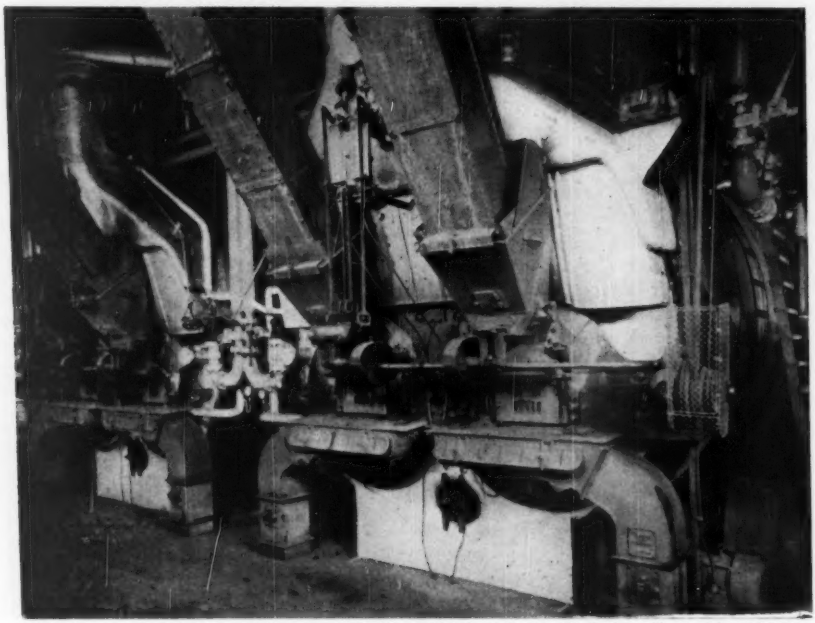

Fig. 1. An installation of Economic boilers (11 ft. 6 in. by 16 ft.) at Tunbridge Wells gasworks

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Laboratory Furnaces, Sand Baths, and Burners
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Gas Lighting Torches for Foundry Cupolas
Heaters for Foundry and Steelworks Ladles
Salt Bath Furnaces. Soft Metal Melting Furnaces
Potato Crisp Cookers and Slicing Machines
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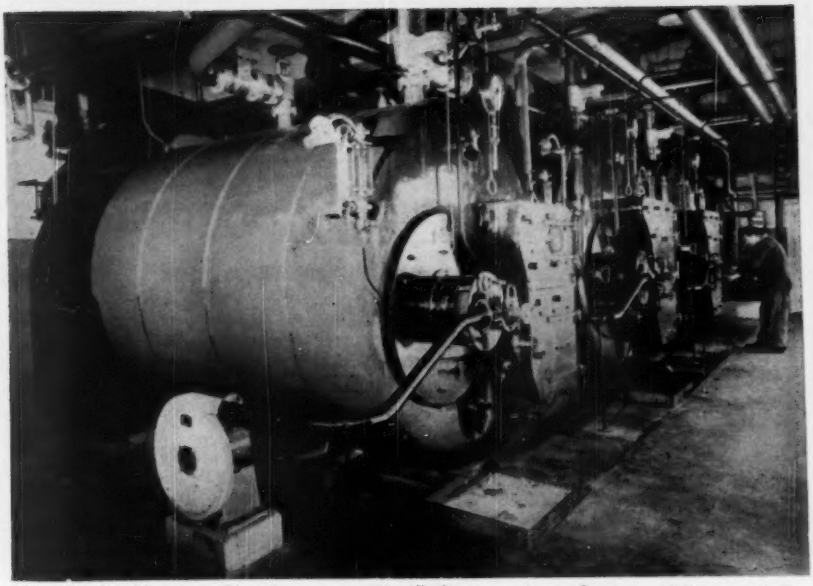


Fig. 2 At Newton Chambers new "Izal" factory three Paxman "Ultranomics" provide steam for space-heating and processing

The design follows generally that of the double-pass boiler except that there is an additional pass for the gases, resulting in a back outlet. The products of combustion pass along the flue, or flues to a brick-lined combustion chamber which is an extension to the boiler shell; returning through the smoke tubes to the front smoke box. Here they return through a further bank of tubes to a chamber immediately above the rear brick-lined combustion chamber and finally through a short metal flue to the induced-draught fan and chimney. This arrangement provides a similar heating surface in a much smaller space than with the "Double-pass" boiler.

On account of the greater resistance to gas flow in the "Treble-pass" boiler it is necessary in all cases to include mechanical or induced draught arrangements.

Constructional Details

The end plates are flanged at a single heat by hydraulic press and the shell plates are rolled to true cylindrical form and fitted with double butt straps over the longitudinal seams. Each shell ring is formed from one plate. The flues are made of welding quality plate, each ring being rolled from a single plate, with electro-welded longitudinal joint, and the ends expanded in a special machine. A strong, yet flexible flue is attained by butting the sections together and jointing by electro-welding, each joint being covered on the water side by a stiffening ring securely welded to the flue plates.

Solid steel pads or weldless steel stand-pipes form the seating for mounting and are securely riveted to the shell.

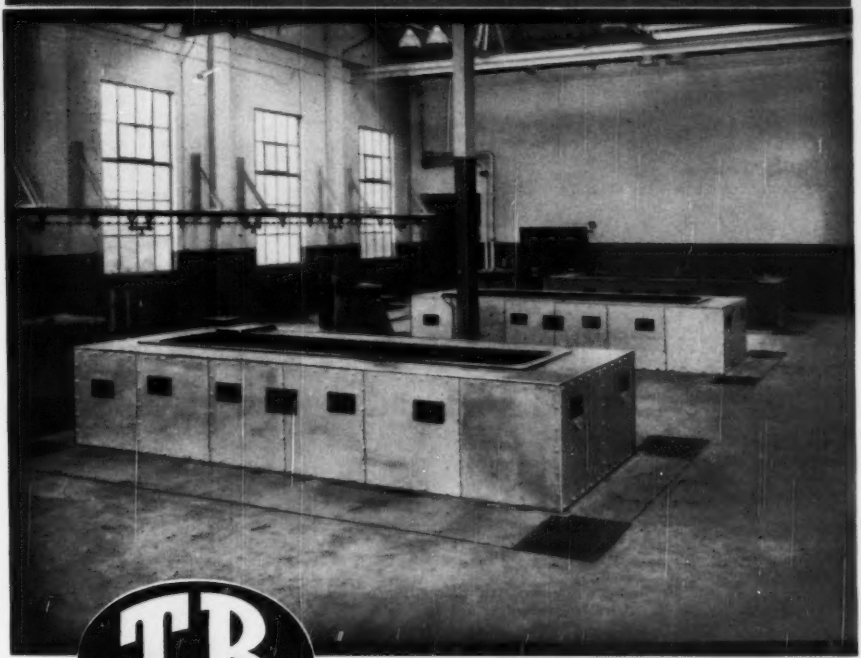
All boiler mountings are of high quality, adequate in size and construction for the duty and pressure required.

After completion the boiler is subjected to an hydraulic test applicable to the working pressure for which it has been built and a certificate of such test is provided. Before leaving the works the boilers are thoroughly scraped and painted with rust-proof paint. Each boiler is complete with brick-lined steel combustion chamber, steel smokebox and fabricated steel supporting cradles.

The "Ultranomic" Boiler

The self - contained and double

MEETING THE DEMAND FOR PRODUCTION GALVANISING



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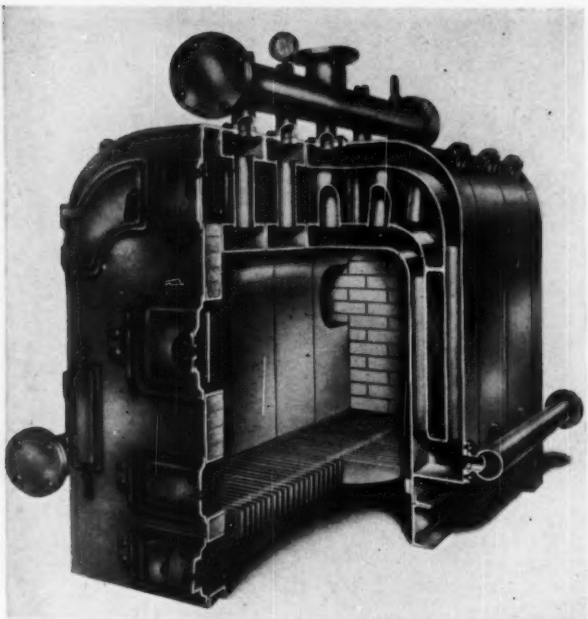

Fig. 3 Cut - away illustration of steel sectional hot water boiler

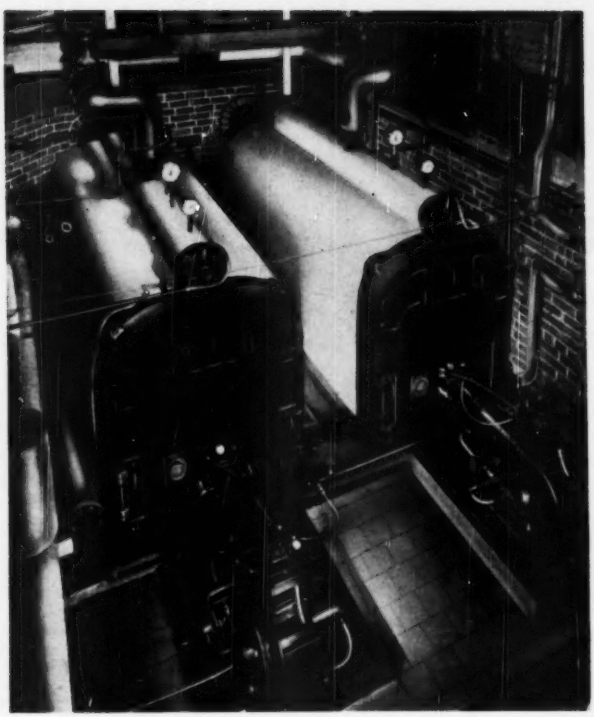

Fig. 4. A steel sectional boiler installation at Nottingham

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return tube types of boilers originally designed and produced by Davey, Paxman and Co. Ltd., deservedly acquired a reputation as economical steam generators. Not content, however, with the success which these boilers achieved, the designers continued their investigations and experiments, as a result of which a new design was patented, which is now widely known as the Paxman "Ultranomic."

One of the principal features of the "Ultranomic" boiler is that it is constructed with one flue only. The whole arrangement is designed to promote a rapid, even and thorough water circulation and easy liberation of steam.

The gases, after passing through the flue, enter a combustion chamber located at the rear of the boiler. The high temperature attained on the inside surface of the firebrick lined combustion chamber ignites any gases which may have left the flue in an unburned condition and in this way better combustion is promoted. The hot gases then pass to the front of the boiler, through a bank of tubes. In these tubes, due to the high velocity and small cross-sectional area of the gas streams, large quantities of heat are given up to the water in the boiler.

Some 20 years ago, the firm introduced the Paxman steel sectional boiler for central heating by hot water. The boiler consists of a series of welded sections, the number of which determines the capacity, the form of the section consisting of an inner and outer element of inverted "U" shape.

The arrangement of the steel baffle between the second and third pass to maintain the gas speed through the second pass, is exclusive to the Paxman steel sectional boiler. In the third pass, three water tubes are provided connecting the inner and outer elements. These tubes are staggered, thus creating a turbulent flow of the gases, thereby improving the heat transmission and water circulation. Each section is self-supporting thus facilitating erection.

Return headers are fixed to the sides or the section, enabling the overall height to be reduced to a minimum especially in the case of oil-fired boilers. This arrangement of the return headers presents definite advantages, although involving a slight increase in the total overall width of the boiler.

Sectional boilers can be arranged for hand firing by coal or coke, automatic stoker, liquid or gaseous fuels.

SATCHWELL TEMPERATURE CONTROL

WE have received a well-illustrated booklet under the above heading from The Rheostatic Co. Ltd., Slough.

Attention is drawn to the extensive representation of the company in all parts of the world.

Various temperature control instruments are described, illustrated and specification details given. Of particular importance is the Satchwell pressure switch (list No. 115) designed to control steam boiler firing systems, air compressors and other installations where oil, gas or water is used up to pressures of 275 lb. per sq. in. The Satchwell flame thermostat (list No. 116) offers flame failure protection for oil-fired installations. The electric pulling motors (list No. 118) are powerful slow speed non-reversing motors designed to operate valves. For example, a motorised double-flow valve (list No. 119) is suitable where automatic control of the flow of liquids or gases is required. Similarly the motorised steam valve (list No. 120) ensures a positive opening and closing under pressure in, for example, steam and high pressure hot water installations. The Satchwell type S. C. Stoker Control (list No. 125) offers a satisfactory control and complete protection for automatic coal stokers. Air thermostats (list No. 130) control the temperature in air ducts and industrial ovens, particularly where the adjusting head and electrical connections must be outside the space being controlled. The Platen thermostat automatically controls the temperature of platens for plastic manufacture and similar solid heating blocks. Of particular interest is the Satchwell Compensator 4 (list No. 136) which controls the temperature of the water in space heating systems in line with changes in the outside weather conditions. It balances heat input with heat requirements, so ensuring equable conditions of comfort at all times and under widely different conditions.

Other equipment referred to includes thermometers (list No. 138), gas valves (list No. 139), mixing valves (list No. 140) and safety gas devices for flame failure protection (list No. 143).

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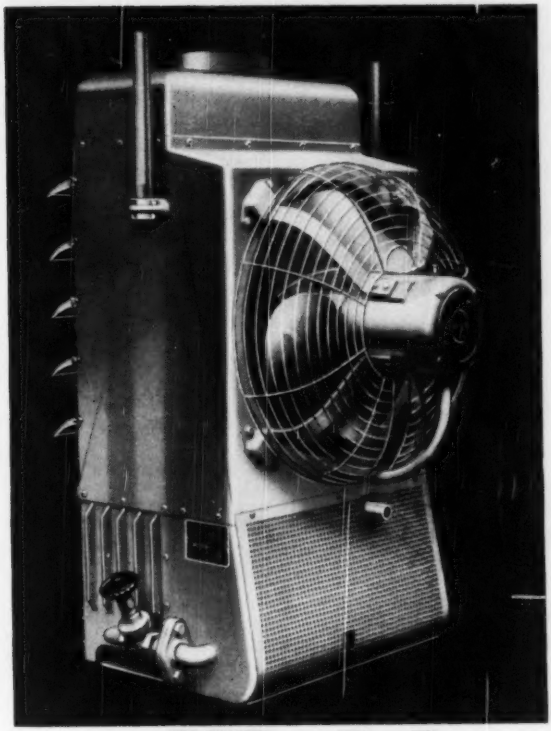

The heating element is made from stainless steel to ensure long life.

They are fitted with automatic control cut outs to render them safe in the event of failure in gas or electrical supplies.

Operation of these units during the normal working period can be simply effected by switching on and off the electrical supply and, therefore, can be satisfactorily controlled by a standard thermostat if required.

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BAKING CRUMPETS

INFORMATION contained in this article deals with an installation of hotplates designed for the baking of crumpets and Scotch pancakes, in the premises of Burridge (Watford) Ltd., consisting of four steam tube hotplates, the dimensions of which are 20 ft. by 2 ft. 6 in. The hotplates were manufactured by Melvin and Gillespie of Glasgow, two being fitted with Selas burners and two with burners supplied by Pattison Lo-Therm Products Ltd., of Caerleon, the latter also have automatic air control diaphragm valves. The gas supply to each hotplate is fitted with a Bryan Donkin governor.

Control Equipment

The control equipment consists of temperature indicating controllers made by the Cambridge Instrument Company, operating through diaphragm relay valves in the gas supply. Their sensitive elements are fitted to the underside of the hotplates.

The flue consists of a 9 in. by 9 in. brick section for a horizontal length of 21 ft. and a 7 in. diameter mild steel vertical section for a height of 20 ft. No flue break is fitted.

Each hotplate accommodates 364 loose rings (3⅜ in. diameter by ⅞ ft. deep) in rows of seven and into these is placed the required amount of dough by a semi-automatic device known in the trade as a depositor. The dough is made up as follows:—140 lb. flour, 15 gallons water, 7 lb. yeast, 7 lb. salt, plus one or two other ingredients in relatively small quantities, which remain a trade secret. The dough is allowed to prove for 2 hours before being transferred to the depositor. Guide rails which are removed when the filling operation has been completed, are fitted to the sides of the hotplate and used as a track for the depositor which is pushed along by the operator. As the centre of the depositor comes into line with each row of tins a half turn is made on the handle and the correct quantity of dough is deposited into the tins. The average time to set the 364 tins on the hotplate and carry out the filling operation is 1½ minutes.

The baking of the first side of the crumpets occupies 9-10 minutes, according to the temperature of the hotplate, and they are then turned over for the completion of the baking operation, the average total time for which is 15 minutes.

Small conveyors are fitted adjacent to each pair of hotplates and after removal from the hotplates by hand the crumpets are automatically conveyed to the packing and despatch section.

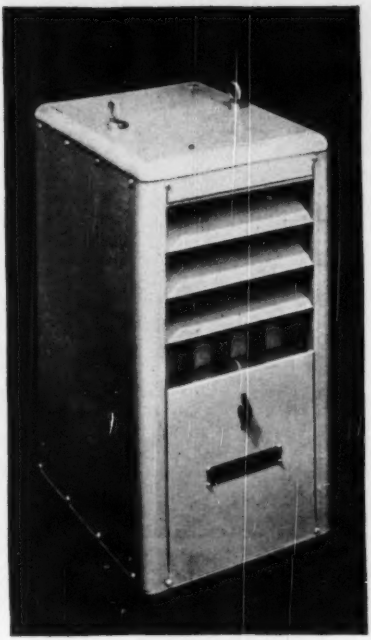
Loss of weight due to evaporation of moisture during baking amounts to ½ oz. for seven crumpets, the initial weight being 15½ oz. Asbestos mats are placed on the hotplates during lunch and tea intervals to prevent unnecessary heat loss.

Performance

The overall working dimensions of the unit are 20 ft. by 2 ft. 6 in. (each hotplate), and the maximum hourly gas consumption is 2,650 c. ft. (four hotplates). Calorific value (nominal) is 500 B.Th.U. per c. ft., specific gravity 0·54. The method of charging is intermittent while the maximum weight of charge is 202 lb. (initial: for four hotplates) with a maximum working temperature of 350° F. The average weight of throughput being 516 lb. per hour (initial: for four hotplates).

From a test taken over a period of 5 hours, including 1 hour lunch break, 2,322 lb. of dough was baked

HARRIS



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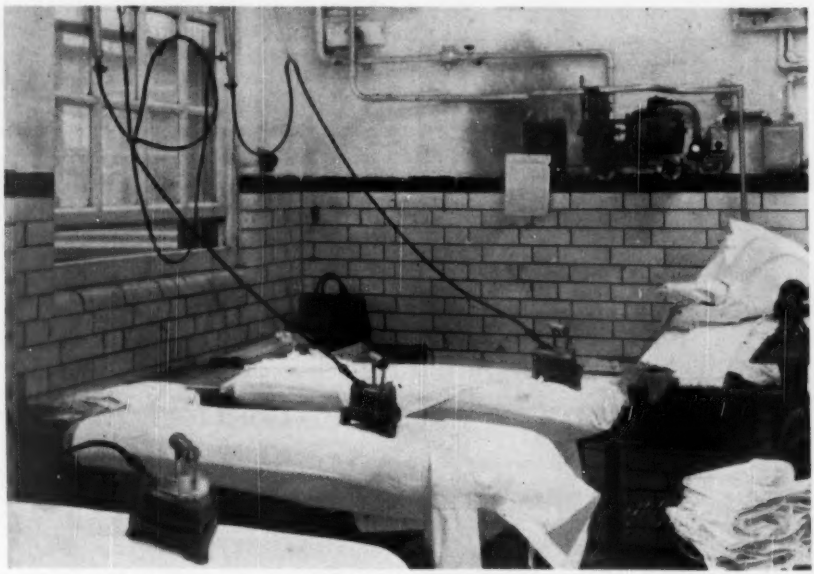
on the four hotplates with a consumption of 8,000 c. ft. (40 therms) of gas, or 58 lb. per therm. The mean operating temperature of the hotplates was 320° F.

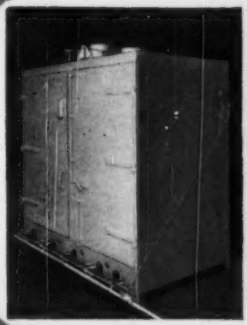
An average charge of 580 lb. of dough or 145 lb. per hotplate, was baked in each hour during an average total baking time of 40 minutes.

During the peak period of the test, a maximum rate of 707 lb. of dough or 177 lb. per hotplate, was baked in each hour during an average total time of 48 minutes. Thus, 12 minutes per hour were occupied in loading and unloading giving approximately 3 batches per hour per hotplate. This indicates that the equipment was working at capacity

Prepared from a report of the Industrial Gas Committee, Eastern Gas Board.



A typical hospital laundry installation showing gas-fired laundry irons with rotary compressor (Keith Blackman Ltd.)



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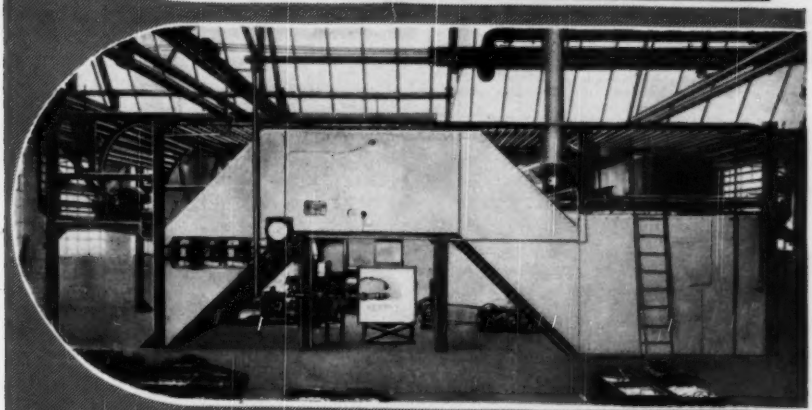

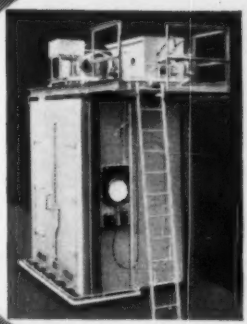

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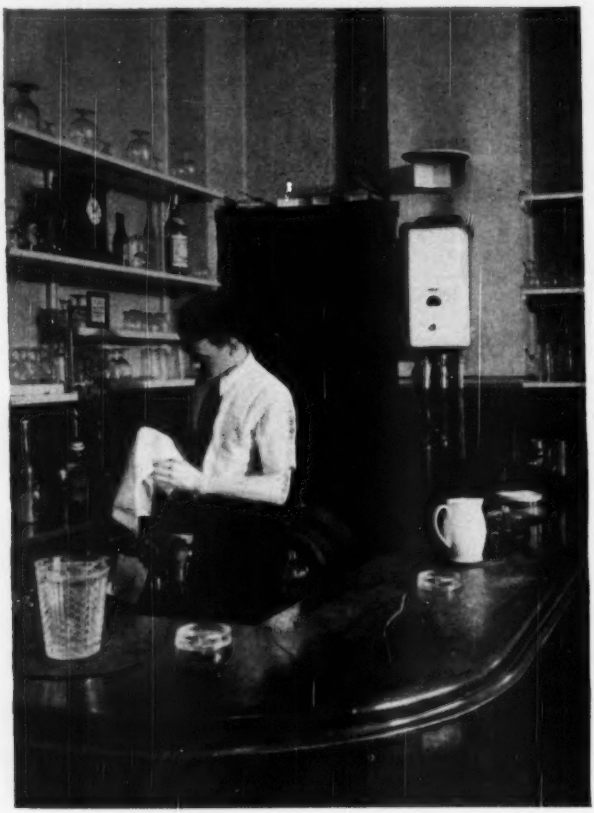
GAS IN THE BREWING INDUSTRY

A LEAFLET under the title "Some Uses of Gas in the Brewing Industry," has been recently issued by the Gas Council, pointing out that gas provides an efficient source of heat which greatly facilitates process work and ancillary tasks. Gas maintains automatic temperature control at all stages in the drying of barley and hops and in the curing and roasting of malt. It also ensures rapid steam raising, under automatic control, for barrel and bottle washing, and for pasteurizing and conditioning of beer.

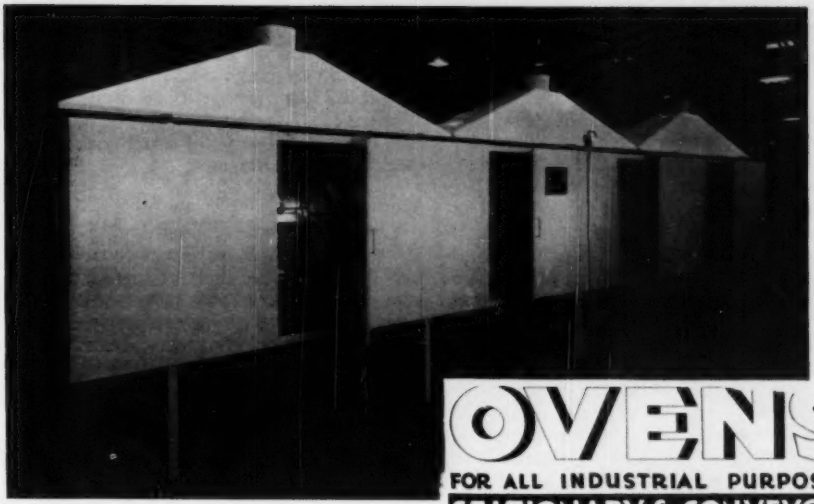
On the question of drying barley and malt it states that remarkable ease of operation and control can be obtained from gas-heated kilns, which are either one or two storeys high.

The grain is spread on the perforated tiled upper floor to a depth of from 6 in. to 2 ft. and dried by gas-warmed air rising from the room below. The successively higher temperatures which are required to complete the curing of malts are provided by gas at every stage.

Brewers and maltsters, while await-



A Ewart M.75 Sink Geyser fitted as a Multipoint in the bar of the Constitutional Club, Windsor



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ing the opportunity of building kilns specially designed for gas heating, can convert existing kilns from solid fuel to gas. One simple conversion system, detailed in the leaflet, employs a "neat" gas burner controlled by relay valve and thermostat, and operating in a combustion chamber situated in the centre of the kiln. The gas consumption per quarter of malt cured in a converted kiln of this kind varies approximately from 6 to 7·5 therms, dependent upon the final colour, while the drying of plain barley requires only 1 to 1·75 therms per quarter, due to the lower moisture content.

Development work is directed towards increasing the efficiency of this process and also reducing the space output requirements.

Continuous Grain Dryer

As an alternative to kiln drying, it is suggested that unmalted cereals can be dried in a continuous gas-heated grain dryer. The grain under process is carried to the top of the dryer by an external bucket elevator. The descending grain is raised in temperature by passing over *closed* air ducts through which hot gases are passed. In the centre section, drying is carried out by hot gases passing through the grain itself from *open* ducts. Finally in the lower section, cold air is drawn through the grain, cooling it and removing a further amount of water vapour. The gas burner operates in a central combustion chamber, and a gas consumption of 0·1 therm per quarter of barley dried is an average figure for this type of plant.

Rotary Roasters

For the deeper colours produced by drying the malt at temperatures higher than are obtainable in a kiln, gas-heated rotary roasters are efficient. The method of firing these roasters varies with the make of the plant, but it is essentially the application of heat direct from aerated gas flames, or radiant burners, plus a degree of convected heat arising from the products of combustion.

A form of sampling device is employed so that inspection of the roasted malt or barley can be carried out without stopping the machine. The roasters rotate at a speed of 18-20 r.p.m. and are often left running with the gas turned off to give polish to the malt. An average malt roaster requires 3·75 to 5·0 therms per hour and will make 12 bushels of black malt or 12 bushels of crystal malt over a period of 2 hours.

Hop Drying

On the subject of hop drying it is stressed that the use of gas in a hop-kiln or oast house ensures drying conditions which are most favourable for fostering aroma and appearance—the two factors which largely determine the quality of the hops.

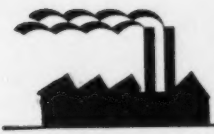
Gas-firing air heaters are used for this operation, to heat the air by direct application of the heat from gas burners, and their use in a kiln or oast house provides a simple but dependable method of drying at low cost. Once lit they require no attention beyond an occasional visit by a screensman to check up air temperatures, etc. They are fully automatic and work without trouble for long periods, and in addition occupy very little space.

In a recent test in an oast house a unit was employed consisting of four burners with "neat" gas jets and having a maximum gas rate of about 850 c. ft. per hour. Two loads, totalling 67·4 "pokes" of wet hops, were dried. Each load took 10¼ hours, for the first six or seven of which the temperature was maintained at 120° F. rising after that time to 140° F. The weight of dry hops was 7·53 cwt. and the gas consumption 74·2 therms or 9·9 therms per cwt.

Pasteurizing and Conditioning

Another operation for which gas is used, is for the pasteurizing and conditioning of beer. The leaflet gives details of the latest method, which is by automatic continuous pasturization plant, using steam supplied by gas-fired boilers.

The beer, after bottling, is run through the plant on trays and subjected to a temperature of from 135° F. to 140° F. dependent on the specific gravity of the beer. In one well-known brewery which pasteurizes beer by this method, a dozen bottles costs something in the region of three decimal points of a penny.



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TES. 1.

Another method is to immerse the bottles of beer in large water-filled vats which are heated externally by gas burners, and thermostatically controlled.

In the storage of bottled beers and ales, gas is used to provide proper conditions. One large brewery with a storage capacity of about 100,000 bottles in one room has for a long period used a small gas boiler, thermostatically controlled, to heat rows of overhead hot water pipes and thus maintain the correct temperature for the good keeping of the beer. Similar automatic and trouble-free heating can be applied in sample stores, public-house cellars or other storage places.

Ancillary Uses

Gas is being used in the brewing industry for a number of other purposes. Caramel, used for colouring purposes, is produced in gas-fired water-jacketed pans; branding irons for cask marking are heated by small gas-fired units; gas is employed in plumbers' shops, maintenance departments and tailors' shops for making occupational clothing connected with breweries; and, of course, in the kitchens of brewery canteens gas-heated equipment is largely used.

BAKERS' AND CONFECTIONERS' EXHIBITION

Wales Gas Board's Exhibit

AFTER a lapse of many years, the South Wales Federation of Master Bakers' Associations held their Bakers' and Confectioners' Exhibition in the Drill Hall, Dumfries Place, Cardiff.

The Wales Gas Board staged an attractive display which indicated the high standard of cleanliness that can be achieved in the bakehouse with the use of up-to-date equipment.

Practical baking demonstrations were carried out daily by Hovis Ltd., and Procea Products Ltd., on a gas-fired Handyman Oven. The range of equipment exhibited included a prover, fondant heater, doughnut fryer (Welsh Enterprises Ltd.), Ellerstyle Thermspray steam boiler and a Mains muffin plate and deep fryer.

To cater for the hot water requirements of the bakery, a Mains M.15 water heater; Potterton hot water storage set; Ideal hot water boiler and Ascot water heater were on view. Completing the exhibits were a Bratt Colbran luminous panel heater and a Radiant Heating "Locost" heater to cover the space heating requirements. Attractive display panels of installations within the area of the Wales Gas Board indicated the developments which are taking place with regard to the baking load.

The exhibit was arranged by the Industrial Gas Centre of the Wales Gas Board, from whom we understand that it was an outstanding success. By a happy coincidence the Federations' Year Book has just been issued. This publication contains a wealth of information for the baker, and among the many articles is "Gas in the Industry" by Mr. W. H. Tarn, Industrial Gas Engineer, Wales Gas Board, giving information on the many uses of gas in the bakery.

GAS IN THE DAIRY

IN the dairy, and in the processes connected with it, it is pre-eminently necessary from the point of view of health and hygiene to ensure absolute cleanliness. There are two ways in which the use of gas can help to achieve this end. In the first place, gas has the advantage of being a clean fuel, and can therefore safely be used in any of the dairy processes. Secondly, by the use of gas-fired appliances, ample and economic supplies of constant hot water can always be obtained and this in itself is of the greatest advantage to the dairyman, in keeping both premises and workpeople spotless. Both aspects will be stressed by the exhibits on the Gas Council Stand at the 64th Annual Dairy Show to be held at Olympia, from the 24th-27th October, where there will be on view a wide range of the latest gas-fired appliances.

The display will include gas-heated sterilisers, pasteurisers, steam raising boilers and water heaters; refrigerators, a brooder and a wide variety of photographs of other appliances. Several of the exhibits will be "live."

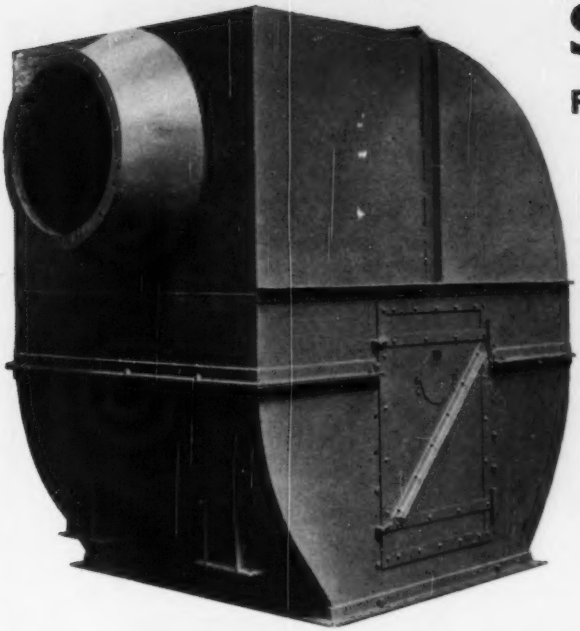

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Illustration shows two Furnaces used in the Tinning of Milk Churns

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The No. 6 Radiant Heat gas salamander

RADIANT HEAT GAS SALAMANDER

USED by many hotels and restaurants, the type of salamander here illustrated is popular with chefs, not only on account of its convenience and efficiency, but because it makes for comfortable conditions in the kitchen.

A feature of the appliance is the speed with which the flameless heat is obtained —flameless, because the cooking is done by radiant heat.

The unit shown here is a large one, specially designed for the Trocadero Restaurant, Shaftesbury Avenue, London. It incorporates six of the surface combustion gas burners, which form a standard part of the equipment of the salamander, which is manufactured by Radiant Heating Ltd., Barnsbury Park, London, N.1.

These appliances, which are made in various sizes—the one referred to is No. 6 of the series, and the largest made to date—are finished in high quality vitreous enamel.

CORRECTION

WE are asked by Mr. A. Higgs, author of the short paper entitled "Pot Life in Gas-Fired Galvanizing Settings" presented with the symposium of short papers at the 87th Annual General Meeting of the Institution of Gas Engineers at Bournemouth on 6th June, and which appeared in the September issue of GAS HEAT IN INDUSTRY, to state that unfortunately an omission occurred in the paper in that the development of the lead jacketed galvanizing pot referred to as the work of the South Eastern Gas Board was mainly the work of a well-known firm of galvanizers with whom the South Eastern Gas Board had collaborated.

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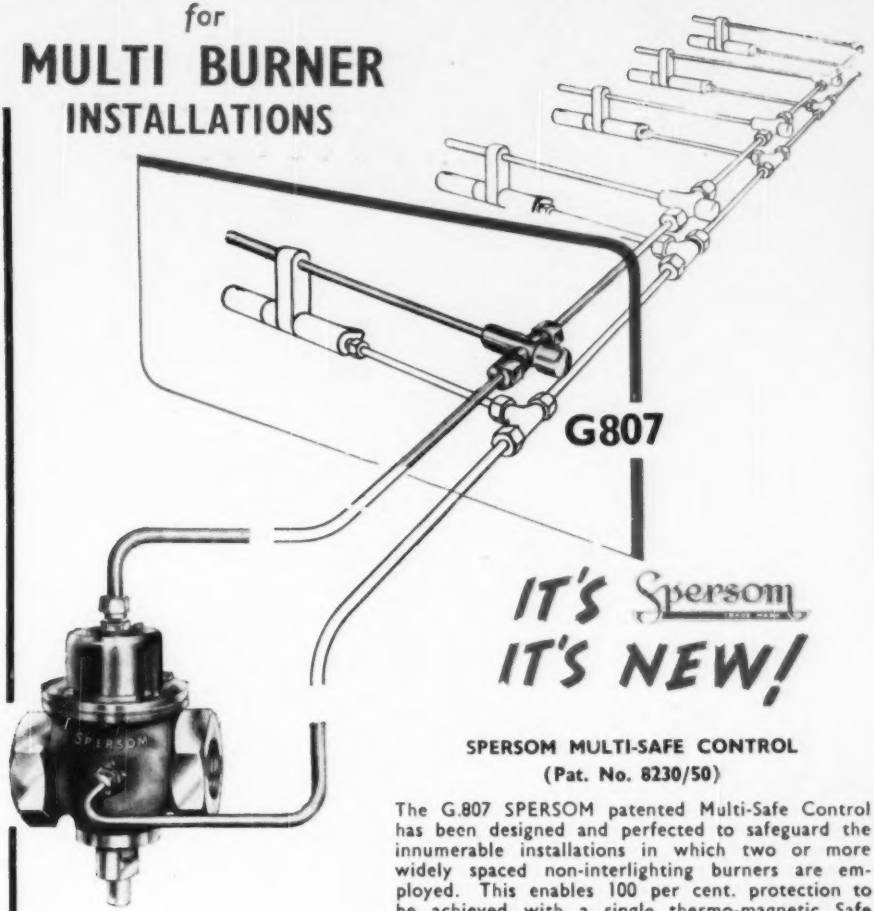

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